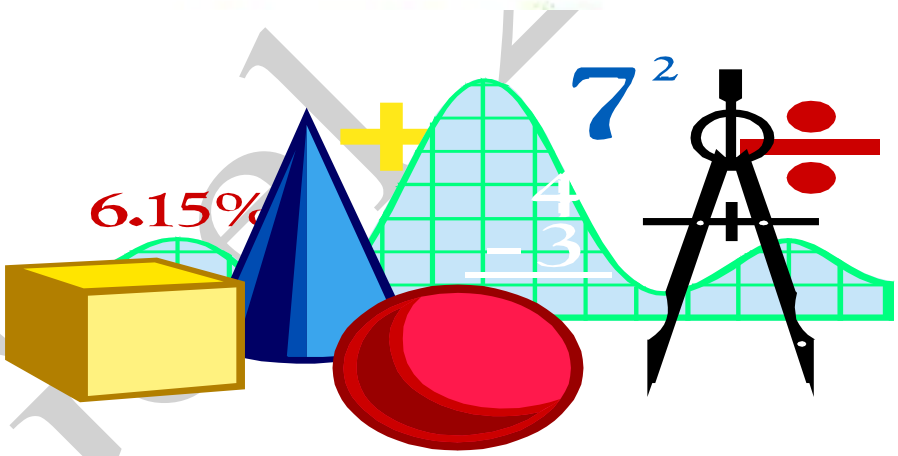
Geel 2000 Language Schools

Math Department

First Term

Prep. 1



Name : ----------

Class: ----------

UNIT 1:
RATIONAL NUMBERS

Lesson 1 : Set of Rational Numbers (Q)

- The set of counting numbers C = { 1, 2, 3, 4, … }
- The set of natural numbers N = { 0, 1, 2, 3, 4, … }
- The set of integer numbers Z = { 0, ±1, ±2, ±3, ±4, … }

Definition of the Rational number (Q) :

Is a number that can be expressed in the form $\frac{a}{b}$ where a and b are integers and

b ≠ 0 . (where the division by zero is meaningless)

The set of rational numbers Q = { X : X = $\frac{a}{b}$, a ∈ Z , b ∈ Z , b ≠ 0 }

1) Show which of the following numbers are rational and which of them are not rational :

$\frac{2}{11}$, zero , 6.5 , -1.8 , $12\frac{5}{6}$

2) Show which of the following numbers are integer :

$\frac{15}{5}$, $\frac{-35}{7}$, $\frac{0}{5}$, $3\frac{1}{4}$

3) Write each rational number in the form $\frac{a}{b}$:

-5 , zero , 0.75 , - 0.01 , 4.5%

4) Complete:

1)If $\frac{5}{a}$ is a rational number, then $a \neq$.....

2)The number $\frac{3}{x-2}$ is a rational number if $x \neq$.....

3)The number $\frac{x+7}{x-3} \in Q$ if $x \neq$.....

4)The number $\frac{2}{5x}$ is a rational number if $x \neq$.....

5)The rational number $\frac{4-x}{x-9} = 0$ if $x =$.....

6)The rational number $\frac{x+5}{x-9} = 0$ if $x =$.....

7) If $\frac{a}{b} = \frac{2}{3}$, then $\frac{3a}{2b}$ = ...

5) **Choose :**

1)If $\frac{15}{x} = \frac{-3}{4}$, then X = …….. (-20 , -5 , 5 , 20)

2)The rational number $\frac{x}{-5}$ is negative if X ……. (> Zero , < Zero , ≤ Zero , = Zero)

3)The necessary condition to make $\frac{5}{x-3}$ a rational number is.....(X=–3,X=3,x=2, X≠3)

4)The necessary condition to make $\frac{7}{x+5}$ a rational number is X ≠ .....(– 5 ,2, 5 ,7)

5)If $\frac{7}{x+5}$ is a rational number , then X ≠..... (– 5 , 0 , 2 , 10)

6)Complete the following table:

The number	$\frac{5}{x-3}$	$\frac{3}{4-x}$	$\frac{7}{8x}$	$\frac{6x}{x}$
Expresses a rational no. if $x \neq$ …	.....	.....	.....	.....

7) Choose :

(1) $0.\dot{5}\dot{7} =$….

(a) $\frac{57}{100}$ (b) $\frac{57}{99}$ (c) $\frac{575}{1000}$ (d) $\frac{19}{33}$

(2) $\left|-\frac{8}{25}\right| =$….

(a) $-\frac{8}{25}$ (b) $-0.3\dot{2}$ (c) $-0.\dot{3}\dot{2}$ (d) 32%

(3) $12\% =$…..

(a) $0.\dot{3}$ (b) 1.2 (c) $\frac{3}{25}$ (d) 0.012

Lesson 2 : Comparing and Ordering Rational numbers

1) Put the suitable sign " > , < , = " :

$\frac{1}{4}$ ..... $\frac{1}{6}$, $\frac{9}{5}$ ..... $1\frac{2}{3}$, 0.5 ..... $\frac{2}{8}$

$\frac{-5}{7}$ ..... $\frac{-3}{2}$, $-3\frac{1}{3}$ ..... $\frac{-20}{6}$, 1.6 ..... $\frac{-8}{5}$

2) Write two rational numbers lying between :

a) $\frac{1}{2}$ and $\frac{4}{5}$

b) 0.3 and $\frac{3}{5}$

3) Write four rational numbers lying between :

a) $\frac{1}{2}$ and $\frac{11}{12}$

b) $-\frac{4}{9}$ and $-\frac{5}{6}$

4) Arrange the following rational numbers in an ascending order:

$\frac{3}{4}, \frac{-5}{8}, -\frac{7}{12}$ and $\frac{2}{3}$

Lesson 3,4: Adding Rational numbers and Properties of addition operation

Properties of the addition operation in Q:

(1) Closure property:

The sum of any two rational numbers is a rational number.

i.e.: Q is closed under addition operation.

(2) Commutative property:

If a and b are two rational numbers, then

a + b = b + a

(3) Associative property:

If a, b and c are three rational numbers, then

(a + b) + c = a + (b + c)

(4) Additive identity:

Zero is the additive identity (additive neutral element).
If a is a rational number, then

0 + a = a + 0 = a

(5) Additive inverse:

If a is a rational number, then a + (-a) = zero
for example: $\frac{3}{5} + \left(\frac{-3}{5}\right) = zero$

1) Calculate the value of each of the following in its simplest form :

a. $\frac{1}{4} + \frac{25}{8}$

b. $-\frac{9}{12} + \frac{3}{16}$

c. $-27\frac{1}{4} + 13\frac{1}{3}$

2) Complete:

(1) The additive identity element in Q is ……

(2) The additive inverse of $\frac{3}{7}$ is ……

(3) The additive inverse of $-\frac{4}{9}$ is ……

(4) $\frac{-6}{-11}$ is the additive inverse of the number ……

(5) The additive inverse of $\left(\frac{2}{3}\right)^{zero}$ is ……

(6) The additive inverse of $\left(\frac{-2}{7}\right)^{zero}$ is ……

(7) The additive inverse of $\left|\frac{-4}{5}\right|$ is ……

(8) The additive inverse of zero is ……

3)Find the result of each of the following in the simplest form:

1) $\frac{3}{7}+\frac{2}{7}=\ldots\ldots$

2) $\frac{5}{6}+\left(\frac{-4}{6}\right)=\ldots\ldots$

3) $\frac{5}{9}+\left|-\frac{4}{9}\right|=\ldots\ldots$

4) $-\frac{2}{9}+\frac{2}{9}=\ldots\ldots$

4)Using the addition properties in Q to find the result of each of the following in the simplest form :

1) $\frac{5}{8}+\frac{-3}{4}+\frac{3}{8}+\frac{3}{4}$

……

……

……

……

2) $\frac{2}{13}+\frac{1}{5}+\frac{11}{13}+(-\frac{6}{5})$

……

……

……

……

Lesson 5 : Subtracting Rational numbers

Properties of the subtraction operation in Q:

Q is closed under subtraction operation, but the subtraction operation in Q is not commutative, not associative, has no identity element and has no inverse.

1) Calculate the value of each of the following in its simplest form :

a. $\frac{3}{7} - (-\frac{2}{5})$

b. $\frac{1}{5} - \frac{2}{3}$

c. $-\frac{2}{5} - \frac{3}{15}$

d. $-13\frac{7}{8} - (-6\frac{7}{8})$

2) Complete :

a. The remainder of subtracting $(\frac{1}{5})$ from $(-\frac{2}{5})$ equals .....

b. $\frac{3}{5} + \frac{7}{10} + (-\frac{1}{2}) =$ .....

c. The remainder of subtracting $-\frac{2}{3}$ from 0 is .....

3) Choose :

a. If $\mathcal{X}=3$, $\mathcal{Y}=4$ and $Z=6$, then $\frac{x}{y} - \frac{z}{x}$ = ... $(-1\frac{1}{4}, \frac{1}{4}, \frac{6}{14}, \frac{12}{28})$

b. $\frac{-3}{5} + \frac{2}{3}$ = ... $(5, \frac{6}{5}, 15, \frac{1}{15})$

c. $|-13| - |13|$ = ... $(-26, -13, 0, 26)$

Lesson 6,7 : Multiplying Rational numbers and Properties of multiplication operation

Properties of the Multiplication operation in Q:

(1) Closure property:

The product of any two rational numbers is a rational number.

i.e.: Q is closed under multiplication operation.

(2) Commutative property:

If a and b are two rational numbers, then $a \times b = b \times a$

(3) Associative property:

If a, b and c are three rational numbers, then $(a \times b) \times c = a \times (b \times c)$

(4) Multiplicative identity:

One is the multiplicative identity (multiplicative neutral element).
If a is a rational number, then $1 \times a = a \times 1 = a$

(5) Multiplicative inverse (reciprocal of the number):

For any rational number $\frac{a}{b}$ except zero there is a multiplicative inverse that is the number $\frac{b}{a}$, where: $\frac{a}{b} \times \frac{b}{a} = 1$

- Zero has no multiplicative inverse because $\frac{1}{zero}$ is undefined.
- Multiplying any rational number by zero equals to zero.

1) Complete:

(1) The multiplicative identity element in Q is ……

(2) The multiplicative inverse of $\frac{3}{7}$ is ……

(3) The multiplicative inverse of $\frac{-2}{3}$ is ……

(4) The multiplicative inverse of -6 is ……

(5) The multiplicative inverse of $3\frac{1}{2}$ is ……

(6) The multiplicative inverse of 1 is ……

(7) The multiplicative inverse of -1 is ……

(8) The multiplicative inverse of $\left(-\frac{3}{5}\right)^{zero}$ is ……

3) Find the result of the following in the simplest form :

a. $\frac{2}{6} \times \frac{-3}{4}$

b. $\frac{-1}{2} \times \frac{2}{3}$

c. $3\frac{1}{8} \times (-4\frac{1}{5})$

d - $0.5 \times \frac{2}{5}$

3)Complete the following :

a. $\frac{2}{3}$ x $(-\frac{4}{5})$ = $-\frac{4}{5}$ x .....

b. $\frac{2}{3}$ x $\frac{3}{2}$ = ...

c. $\frac{-4}{11}$ x ..... = 1

d. ..... x 0.8 = 1

e. If $\frac{x}{y} = \frac{2}{3}$, then $\frac{3x}{2y}$ = ...

f. The multiplicative inverse of the number $\frac{-9}{8}$ is .....

g. The simplest form of the expression $\frac{3}{4}$ x $(\frac{1}{2} - \frac{3}{2})$ is .....

h. If $-3\frac{4}{7}$ x X = $-3\frac{4}{7}$, then the value of X = ...

i. The rational number which hasn't a multiplicative inverse is .....

j. The number that hasn't a multiplicative inverse is .....

k. 3 × ..... = 1

l. The additive inverse of the number $\frac{7}{25}$ X (-5) is .....

m. 7 x $\frac{.....}{7}$ = 1

n. $\frac{-4}{5}$ x ..... = $\frac{-4}{5}$

o. $2\frac{3}{5}$ x ..... = 1

p. 4 x ..... = -5

q. If $\frac{a}{b}$ = 70 , then $\frac{a}{2b}$ = ...

4)Using the distribution property, find the value of each of the following in

the simplest form :

a) $4 \times \frac{8}{17} + 9 \times \frac{8}{17} + 4 \times \frac{8}{17}$

.....

.....

b) $\frac{22}{25} \times \frac{7}{11} + \frac{5}{11} \times \frac{22}{25} - \frac{22}{25}$

.....

.....

c) $35 \times \frac{3}{4} + 35 \times \frac{1}{2} - 35 \times \frac{1}{4}$

.....

.....

d) $\frac{5}{17} \times 10 + \frac{5}{17} \times 23 + \frac{5}{17}$

.....

.....

Dividing Rational numbers

Distribution property:

If a, b and c are three rational numbers, then

$a \times (b + c) = a \times b + a \times c$

$a \times (b - c) = a \times b - a \times c$

1) Find the result of the following in the simplest form :

a. $\frac{5}{27} \div \frac{1}{9}$

b. $-\frac{1}{6} \div \frac{5}{2}$

c. $-\frac{5}{16} \div (-\frac{11}{8})$

d. $-1 \div 2\frac{1}{4}$

e. zero $\div \frac{3}{5}$

2) Find the result of the following in the simplest form :

a. $(\frac{3}{8} + \frac{5}{8}) \div \frac{5}{8}$

b. $(5\frac{1}{16} \div 6\frac{3}{4}) \times (-7\frac{5}{9})$

c. $-\frac{5}{2} \div (\frac{3}{4} + \frac{1}{2} - \frac{1}{3})$

d. $\frac{1}{3} \times (-\frac{1}{3}) \div (-\frac{1}{3}) \times \frac{1}{5}$

3) Choose :

a. If a x $\frac{b}{3}$ = $\frac{a}{3}$, then b equals ……. (-a , 1 , a)

b. which of the following relations are true , where X= 3 , y = 5 , Z = 15

(Y=XZ , X=YZ , y = $\frac{Z}{x}$)

c. The property used in the operation $\frac{6}{7}$ x 1 = $\frac{6}{7}$ is .....

(Associative , Commutative , Multiplicative-identity , Multiplicative-inverse)

d. If 3a = 27 and a b = 1 , then b = …….. (5 , $\frac{1}{9}$, $\frac{1}{5}$)

4) If X = - $\frac{1}{3}$, Y = $\frac{3}{4}$ and Z = -3 ,then find the value of :

a.(X + Y) ÷ Z

b. XY + YX

5) If X = $\frac{3}{2}$, Y = - $\frac{1}{4}$ and Z = -2 ,then find the numerical value of

X – (Z ÷ Y)

6) If X = $\frac{2}{3}$, Y = - $\frac{1}{6}$, Z = -3 ,then find (X ÷ Y) – (Z ÷ Y)

7) If X = $\frac{1}{2}$, Y = $\frac{-2}{3}$ and Z = 2 ,then find the numerical value of $\frac{y-z}{x}$

Lesson 9 : Applications on the Rational numbers

1) Find the rational number in the middle of the way (half-way) between:

(1) $\frac{3}{8}$ *and* $\frac{5}{8}$ ……

(2) $\frac{-3}{4}$ *and* $\frac{3}{4}$ ……

2)Find a rational number lying :

a)One fourth of the way between $\frac{5}{7}$ and $\frac{-3}{7}$ from the side of the smaller number

b)One third of the way between $\frac{4}{7}$ and $1\frac{3}{4}$ from the side of the smaller number

c)One fifth of the way between $\frac{-2}{3}$ and $\frac{-3}{5}$ from the side of the smaller number

3)Complete :

a. The rational number half way between $\frac{-5}{2}$ and $\frac{-3}{2}$ is ……

b. The rational number that lies one fifth of the way from $\frac{1}{2}$ to 1 is ……

c. The number that lies half way between $\frac{1}{2}$ and $\frac{5}{8}$ is ……

UNIT 2

ALGEBRA

Lesson 1 : Algebraic Terms & Algebraic Expression

Algebraic term :

The algebraic term is formed from the product of two or more factors.

Ex.: $3x$ → Algebraic term (monomial)

3 → Numerical factor (coefficient of the algebraic

x → Algebraic factor

The degree of the algebraic term :

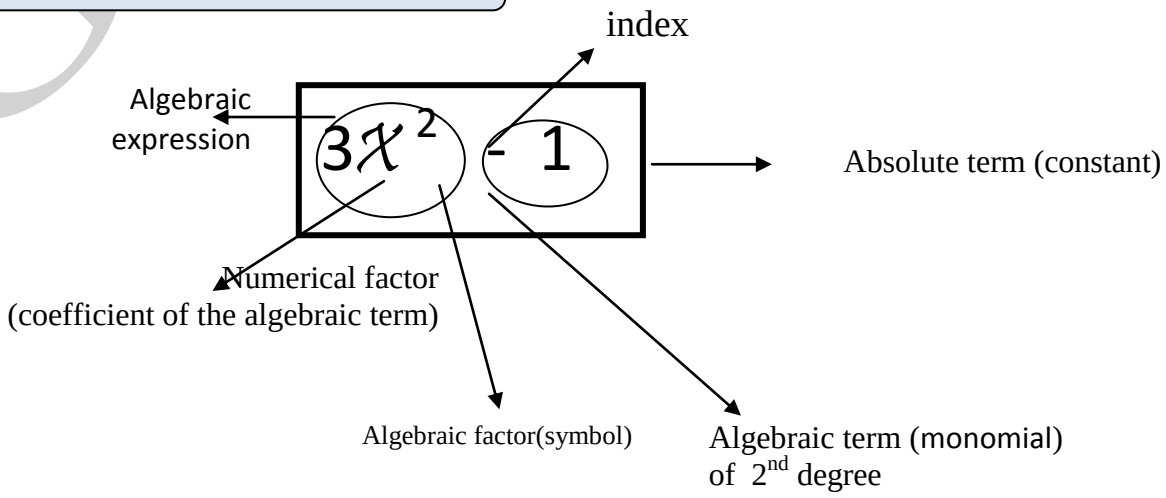
It is the sum of the indices of the algebraic factors in this term.

Algebraic Expression :

The algebraic expression consist of an algebraic term or more.

The degree of the Algebraic Expression :

It is the highest degree of the terms forming it.



1) Complete :

a. The degree of the algebraic term $3X^2Y$ is …… and its coefficient is ……..

b. The degree of the algebraic term $-3a^2b$ is …… and its coefficient i……..

c. The degree of the algebraic term $-2X^2Y$ is …… and its coefficient ……..

d. The algebraic term $2XY^3$ whose degree is ……

e. The algebraic term $-4XY^2$ of …… degree .

f. The coefficient of the algebraic term $\frac{1}{2}X^3YZ^2$ is …… and its degree……

g. The coefficient of the algebraic term X is …… and its degree is ……

h. The coefficient of the algebraic term $(-2)^3$ is …… and its degree is ……

i. $5X^2 + 3$ is an algebraic expression of the ……. degree.

2) Choose :

a. The coefficient of the algebraic term $2X^3Y^4Z^5$ is …….. (2 , 3 , 4 , 5)

b. The algebraic expression $X^3 - 3X^2 + 4$ is of the …… degree

(first , second , third)

c. The algebraic term $2X^3Y^2$ whose degree is ……

(the third , the fourth , the fifth)

d. The degree of the algebraic term X^4Y equal the degree of the algebraic term …….

(X^3Y^2 , X^4Y^2 , X^2Y^2)

e. The algebraic term b^3 = …… (3 x b x b , b + b + b , b x b x b)

Lesson 2 : Like Algebraic Terms

1) Reduce to the simplest form:

1) 3a + 2b + 5a + 4b = ……

2) 2x – 4y – 9x – 3y = ……

3) 19 m – 4 n + 11 m – 17 n + 9 n = ……

4) 4 a + a b + 5 a – 2 b + 6 b – 3 a = ……

2)Complete :

a. 5a increases 3a by ……

b. 7$\mathcal{X}$ increases -3$\mathcal{X}$ by ……

3) Find the result of each of the following:

(1) 3 x + x = ……

(2) 7 y – y = ……

(3) 3 x + 2 x = ……

(4) 5 y – 3 y = ……

(5) 4 z – 11 z = ……

(6) – 7 x – 2 x = ……

4) Reduce each of the following algebraic expressions:

1)5x + 4 - 3x2 – 6x – 7x2 =

……

2)a2 + 4a – 5 + 3a2 – 6a + 1 =

……

Lesson 3 : Multiplying & Dividing Algebraic Terms

1) Multiply:

a. (5 X) x (3 y) =

b. -8 y5 x (-7 y4)=

c. 5 a b2 x (-2 a2 b)=

d. a b x (-3 a) x (-2 b)=

e. (-3 a) x (7c)=

f. (2 X y) x (-3 X2)=

g. $5x^3y^4 \times 2xy^2$ =

2) Find the quotient of each of the following :

g. 6 a ÷ 2=

h. -14 X 2 ÷ 7X=

i. -25 a6 ÷ (-5 a2)=

j. -18 X 5 y6 Z3 ÷ (-6 X 3 y3 z3)=

k. $\left(-32a^3b^6\right) \div \left(-4a^3b^2\right)$ =

Lesson 4 : Adding & Subtracting Algebraic Expression

1)Choose :

a. 2X + 3Y is greater than 3Y – 2X by …….. (- 6Y , - 4X , 4X , 6Y)

b. If a2 = 25 , b2 = 9 and a b = 15 , then (a – b)2 ……. (- 4 , 4 , 8 , 12)

c. The remainder of subtracting (-5X) from 3X = ……. (-2X , 2X , 8X2 , 8X)

d. The rectangle whose length is 6L and its width is 3m, then its perimeter is = ……

(9L , 3 (2L + m) , 6 (2L + m))

2)Find the sum of each of the following :

e. 2X – 7Y + Z , 5Z + 6Y – 2X

……

f. 3X - 2Y + 5 , 2X +Y - 3 .

……

g. 2X 2 – 3 X Y + Y 2 , X Y – 2 Y 2 + X 2 , 3 X Y – 2 X 2 .

……

……

……

3)Subtract :

a. $3x^2 - 1 - 5x$ from $1 - 5x + 6$

……

b. $5x^2 + y^2 - 3xy$ from $x^2 - 2xy + 3y^2$.

……

4)What is the increase of :

a. $2x^2 - 3x + 1$ than $5x + 2x^2 - 1$

……

b. $3x^2 - 5x + 2$ than the sum of : $x + 5x^2 + 1$ and $2x^2 - 4 - 2x$.

……

5) What is the decrease of :

a. $3y^2 - 2xy + x^2$ than $3x^2 - 5xy + y^2$

……

b. $2a^2 - 3ab - 5b^2$ than $4b^2 + 3a^2 + a\,b$

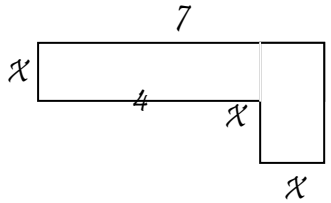
……

c. $2a - 8b - c$ than the sum of $3a - 3b + c$ and $2a - 4b - 8c$.

……

6) In the opposite figure :

Find the perimeter and the area of the figure.



Lesson 5 : Multiplying a Monomial by an Algebraic Expression

1) Find the following products :

a. -3 (y + 3)

b. -5X (2X + y – 3Z)

c. 3Xy (2X2 – 5X2y – 4y2)

d. $\frac{1}{3}$ X2 (6X2 – 9Xy – 3y2)

2) Complete :

e. X (..... - 2X) = 6X - .....

f. 2X (..... - 5y) = 8 X 3 - .....

g. -2 a b (..... + 2 a2 b) = - 6 a2 b3 - .....

h. 2X (3X - .....) = ... – 10 X

i. -4 a (2a b - .....) = ... + 8 a b2

3) Put in the simplest form:

$3a(a-b)+4a(2a+b)$ =.....

.....

.....

Lesson 6 : Multiplying a binomial by an Algebraic Expression

1) Multiply the following:

(1) $(x+3)(x+2)$ = ...

(2) $(x-3)(x-2)$ = ...

(3) $(y-4)(y+5)$ = ...

(4) $(5m-2)(6m+1)$ = ...

(5) $(4x+1)(2x+3)$ = ...

(6) $(3a+2b)(2a-5b)$ = ...

(7) $(b^2-4)(b^2+2)$ = ...

(8) $(x-y)(7y-x)$ = ...

2) Find:

1) $(x+2)^2$ = ...

2) $(x-1)^2$ = ...

3) $(2y+3)^2$ = ...

3) Find:

1) $(x+3)(x-3)$ = ……

2) $(x-4)(x+4)$ = ……

3) $(a^2+a)(a^2-a)$ = ……

4) $(3x^2+5y^2)(3x^2-5y^2)$ = ……

4) Simplify Multiply the following :

a)(3a + 2b)(2a – 5b)= ……

b)(3m2 + 8)(2m2 – 3)= ……

c)(4m – 7)2 =……

d)(2X + 3y)2 =……

e)(4m – 7)(4m + 7)= ……

f)(3X2 - 5y2)(3X2 + 5y2)= ……

g)(X + 3)(X2 + X + 1)= ……

h)(2y + 1)(y2 + y + 5) =……

i)(X + 4)2 (3X + 2)= ……

5)Simplify :

1)2a (3a – 1) + 3a (a + 2) , then find the value of the result when a = 1

……

……

2)X (2X – y) – 2y (X – y) , then find the value of the result when X = 2 and y = -1

……

……

3) (2X – 2)2 + (X – 2)(X + 2) , then find the numerical value of the result

when X = -1

……

……

4)If : a = 3X – 4 and b = X + 2 and c = 2X – 3

Find the value of the expression : a b – c2 when X = zero

……

……

Lesson 7 : Dividing an Algebraic Expression by a Monomial

1)Find the quotient:

1) $5a-10$ by 5 = ……

2) $4a^2+6a$ by $2a$ = ……

3) $12a^2b+20a\ b^2$ by $4a\ b$ = ……

4) $16a^3b^2-24a^2b^2$ by $4a^2b$ = ……

5) $12x+15y$ by -3 = ……

6) 60X 6 – 48X 10 – 12X 3 by -12X 3 = ……

3a2b – 6ab2 + 12ab by -3ab = ……

Find the quotient of each of the following:

$\frac{26x^2+14x^4}{2x}$ = ……

$\frac{18m^4+32m^2}{-2m^2}$ = ……

3)Divide : (12X 3 y2 – 4X 2 y3) by 4X 2 y2 , then find the numerical value of the result

when X = 1 and y = -1

Lesson 8 : Dividing an Algebraic Expression by another Expression

1) Find the quotient in each case :

a. $X^2 - 5X - 14$ by $X - 7$

……

……

……

b. $3X^2 + 2X - 8$ by $3X - 4$

……

……

……

……

c. $6X^3 + 7X^2 - 18X + 5$ by $3X^2 - 4X + 1$

……

……

……

……

2)Find the value of K that makes the expression : $X^3 - 3X^2 - 25X + K$ is divisible by $3X - 5$

……

……

……

……

Lesson 9 : Factorization by Identifying the Highest Common Factor (H.C.F.)

To find the highest common factor for some algebraic terms :

- We find the highest common factor of the numerical coefficients of these terms.
- We take each repeated symbol in all terms with the smallest index.

1)Factorize each of the following by identifying the H.C.F. :

1) $5a + 5b$ = ...

2) $3x - 3y$ = ...

3) $5a - 5b + 5c$ = ...

4) $3x(a + b) + 7(a + b)$ = ...

5) 32X 3 y3 + 16X 2 y2 + 8X Y = ...

6) 6a2 (X – 1) – 8a (X – 1) = ...

7) 4m2 (2X + y) – 3m (2X + y) – 7(2X + y) = ...

2)Factorize each of the following by identifying the H.C.F.:

1) $6a^3 - 4a^2b^2$ = ...

2) $6a + 8b - 10c$ = ...

3) $x^3 + 2x^2 + 5x$ = ...

3)Factorize each of the following by identifying the H.C.F. :

a) 15 x 17 + 15 x 13 – 15 x 30

= ……

$48 \times 45 + 48 \times 55$

= ……

b) $7 \times 123 + 7 \times 35 - 7 \times 18$

= ……

c) 35 + 14 x 35 – 5 x 35

= ……

d) 5 x $(48)^2$ + 7 x 48 + 53 x 48

= ……

4)If a + c = -3 , find using factorizing by identifying H.C.F. the numerical value of the expression : 2a (a + c) + 2c (a + c)

= ……

= ……

UNIT 3
STATISTICS

Lesson 1 : The Arithmatic Mean

The Arithmatic Mean = $\frac{\textit{The Sum of the values}}{\textit{their Number}}$

1) Complete :

a) The mean of the values 2 , 5 , 8 , 9 , 14 , 28 is ……

b) The mean of the values 5 , 12 , 6 , 17 is ……

2) Choose the correct answer from the given ones:

(a) The mean of: 5, 12, 6, 17 is …… (a) 4 (b) 5 (c) 6 (d) 10

(b) The mean of: x+y, 9-y, -x is …… (a) 3 (b) 9 (c) 2 (d) zero

(c) If the mean of: 9, 4, 5, x is 5, then x = …… (a) 2 (b) 3 (c) 4 (d) 5

(d) If the mean of: 3, 4, 8, a, a+2 is 15, then a = …… (a) 29 (b) 5 (c) 75 (d) 17

3) If the heights of 5 students in grade 1 prep. in cm. are 124, 130, 122, 126, 128, calculate the mean height of those students.

……

Lesson 2 : The Median

The median of a set of values is the value which divides this set such that the number of values which are greater than it is equal to the number of values which are less than it .

To get the median, do as follows :Arrange the values ascendingly /descendingly

Then

If the number of values is odd :
The median is the value which is in the middle exactly.

If the number of values is even :
The median = the sum of two middle values ÷ 2

1) Complete :

a) The median of the values 8 , 17 , 4 , 6 , 10 is ……

b) The median of the values 25 , 32 , 28 , 40 , 50 , 58 , 50 is ……

c) If the order of the median of a number of ordered values is the fifth, then the number of these values is ……

d) The median of the values 2 , 5 , 5 , 6 , 7 , 9 , 11 , 14 , 16 , 21 is ……

2) The following table shows the daily study hours of two friends in a week .Find the median of the study hours for each friend.

Sally	3	2	45	7	35	5	4
Basma	4	3	6	2	5	3	45

Lesson 3 : The Mode

The mode of a set of values is the most common value.

1)Complete :

a) The mode of the values 3 , 10 , 6 , 13 , 19 , 19 , 21 is ……

b) The mode of the values 5 , 33 , 5 , 33 , 3 , 5 is ……

c) The mode of the values 8 , 11 , 5 , 8 , 4 , 5 , 4 , 11 , 4 is ……

d) If the mode of the values 12 , 7 , X+1 , 7 , 12 is 7 , then X = ……

e) If the mode of the values 4 , a , 5 , 3 is 3 , then a = ……

2)The following table represents the marks of 40 pupils in an examination :

The mark	15	16	17	18	19	20
No. of pupils	4	5	8	12	7	4

Find the mode mark .

3) Ashraf recorded the lengths of his bus journeys to school for 3 weeks.
He wrote times to the nearest minute :

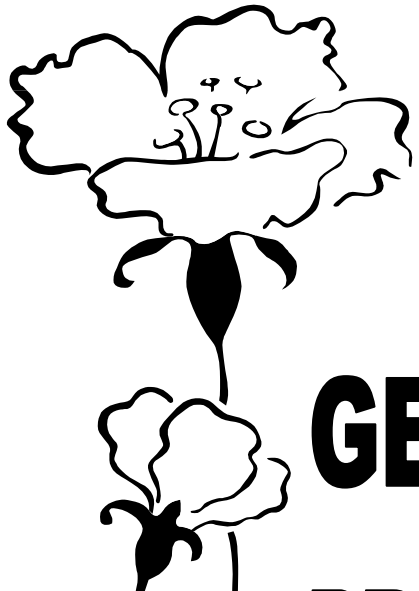
15 , 17 , 16 , 16 , 17 , 15 , 13 , 22 , 14 , 25 , 17 , 16 , 18 , 15 , 19

a) Calculate the median time.
b) Calculate the mode time.
c) Calculate the mean time.

4) The following table shows the number of hours of daily study for each of Mahmoud
and Kareem during a week :

Find the mean of the study hours for each of them.
Determine the median hours for each of them.
Determine the mode of study hours for kareem.

Mahmoud	7	5	8	9	8	6	4
Kareem	8	9	7	9	9	5	5



GEOMETRY FOR PREPARATORY ONE

FIRST TERM

Sheet (1)
Geometric Concepts

[1] The line segment:

It is the set of points between two distinct points and denoted by

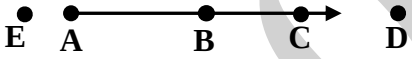
$\overline{AB}$ or $\overline{BA}$

$AB = 6\,cm$, $C \in \overline{AB}$, $D \notin \overline{AB}$

---

[2] The ray:

It is a line segment extended from only one of its terminals infintly and denoted by $\overrightarrow{AB}$



$C \in \overrightarrow{AB}$, $D \in \overrightarrow{AB}$, $E \notin \overrightarrow{AB}$, $\overline{AB} \subset \overrightarrow{AB}$, $\overrightarrow{AB} \neq \overrightarrow{BA}$

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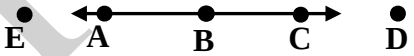
[3] The straight line:

It is a line segment extended from its two terminals infinitely and denoted by $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$



$C \in \overleftrightarrow{AB}$, $D \in \overleftrightarrow{AB}$, $E \in \overleftrightarrow{AB}$, $\overline{AB} \subset \overrightarrow{AB} \subset \overleftrightarrow{AB}$

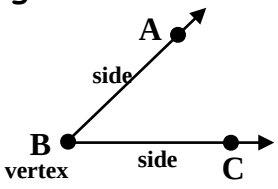
---

[4] The angle:

It is the union of two rays having the same starting point (vertex of the angle) the two rays are called two sides of the angle.

$\angle ABC$, $\angle CBA$ or $\angle B$

$\overrightarrow{BC} \cup \overrightarrow{BA} = \angle ABC$

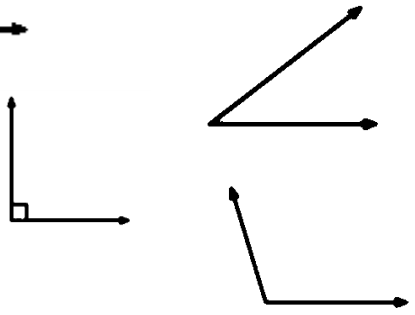


Types of angles:

(1) **Zero angle**: Its measure = 0°.

(2) **Acute angle**: 0° < its measure < 90°.

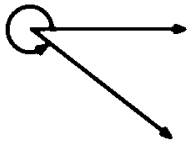
(3) **Right angle**: Its measure = 90°.



(4) **Obtuse angle**: 90° < its measure < 180°.

(5) **Straight angle**: Its measure = 180°. ⟷

(6) **Reflex angle**: 180° < its measure < 360°.



[1] Complete the following table:

$m(\angle B)$	50°	.....	105°	.....	179°	.....	$115^\circ\ 46'$	.....
$m(\text{reflex } \angle B)$	.....	330°	.....	237°	.....	350°	.....	$200^\circ\ 19'\ 30''$

[2] Mention the type of the angle whose measure is as follows:

(1) 57° .....

(2) 117° .....

(3) 90° .....

(4) 200° .....

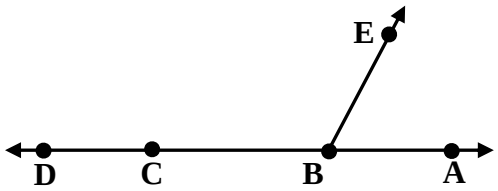
(5) 180° .....

(6) $43\frac{1}{2}^\circ$ .....

(7) $179^\circ\ 62'$ .....

(8) $90\frac{2}{5}^\circ$ .....

[3] From the opposite figure, complete using (∈), (∉), (⊂) or (⊄):



(1) A ..... $\overrightarrow{DC}$

(2) D ..... $\overline{AC}$

(3) C ..... $\overleftrightarrow{AB}$

(4) A ..... $\angle EBC$

(5) $\overline{DC}$ ..... $\overleftrightarrow{AB}$

(6) $\overline{BC}$ ..... $\overrightarrow{BA}$

(7) $\overrightarrow{BA}$ ..... $\overleftrightarrow{DC}$

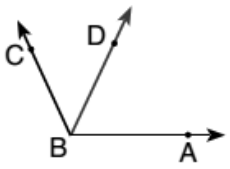
(8) $\overline{AC}$ ..... $\overline{AD}$

Sheet (2)
Some Relations Between Angles

Adjacent angles

Two angles are said to be adjacent if they have a common vertex, a common side and the other two sides are on opposite sides of the common side.

∠ABD, ∠DBC are adjacent



Complementary angles

Two angles are said to be complementary if their sum is 90°.

And the two outer sides are perpendicular

[1] Write the measure of the angle which complements each of the angles whose measures are as follow:

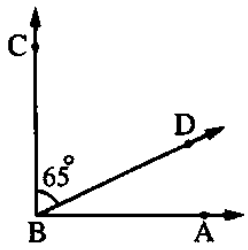
(1) 30° …… (2) 60° ……

(3) 48° …… (4) 0° ……

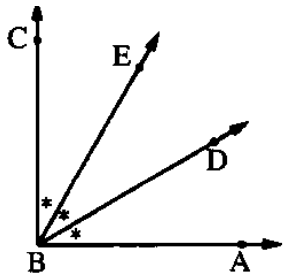
(5) 90° …… (6) $22\frac{1}{2}^{\circ}$ ……

(7) $25^{\circ}\,30'$ …… (8) $53\frac{1}{4}^{\circ}$ ……

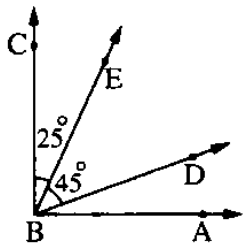
[2] In each of the following figures $\overrightarrow{BA} \perp \overrightarrow{BC}$, Complete:



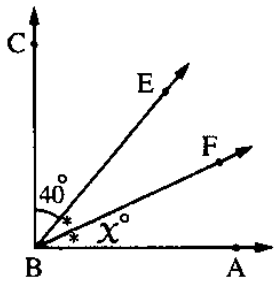
(1) m (∠ ABD) = ……°



(2) m (∠ DBC) = ……°



(3) m (∠ ABD) = ...°

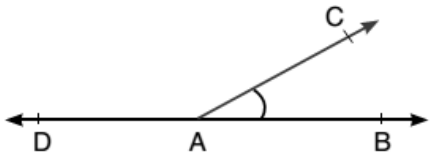


(4) X = ...°

Supplementary angles

Two angles are said to be supplementary if their sum is 180°.

Two adjacent angles formed by a straight line and a ray with a starting point on this straight line are supplementary



m (∠BAC) + m (∠CAD) = 180°

[3] Write the measure of the angle which supplements each of the angles whose measures are as follow:

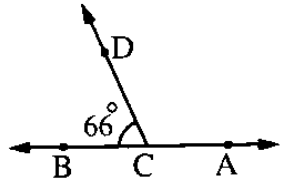
(1) 20° ..... (2) 90° .....

(3) 152° ..... (4) 0° .....

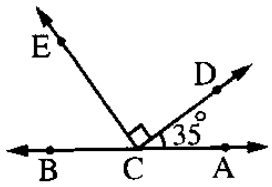
(5) 180° ..... (6) $92\frac{1}{2}^{\circ}$ .....

(7) $141^{\circ}\,24'$ ..... (8) 10° .....

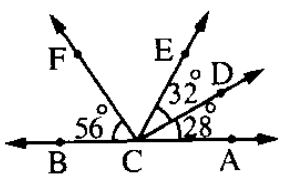
[4] In each of the following figures $C \in \overleftrightarrow{AB}$, Complete:



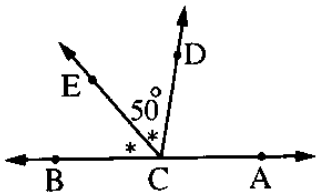
(1) m (∠ ACD) = ...°



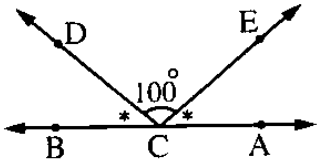
(2) m (∠ ECB) = ...°



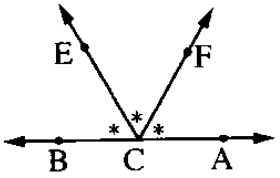
(3) m (∠ ECF) = ...°



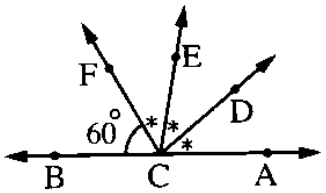
(4) m (∠ ACD) = ...°



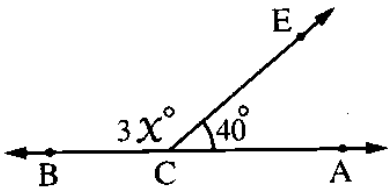
(5) m (∠ DCB) = ...°



(6) m (∠ FCB) = ...°



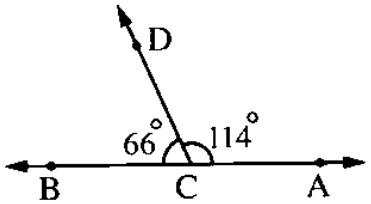
(7) m (∠ DCB) = ...°



(8) X = ... °

If two adjacent angles are supplementary then their outer sides are on the same straight line.

[5] In each of the following figures, state if $\overrightarrow{CA}$ and $\overrightarrow{CB}$ are on the same straight line or not, and why?



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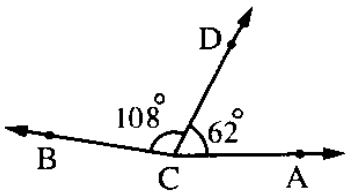

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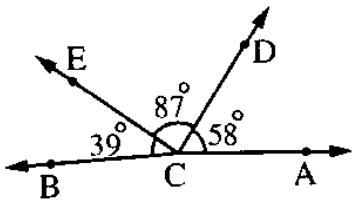

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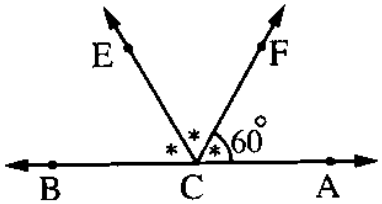

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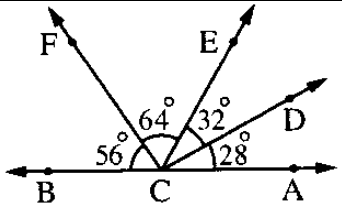

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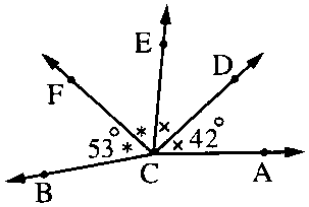

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[6] Complete the following:

(1)	The angle is .....
(2)	The measure of the straight angle = ... ° and the measure of zero angle is ..... °
(3)	The measure of the right angle = ... °
(4)	The acute angle is the angle whose measure is less than ..... and more than .....
(5)	The two complement angles are the two angles whose sum of their measures is .....
(6)	The two supplement angles are the two angles whose sum of their measures is .....
(7)	The two adjacent angles formed by a straight line and a ray with a starting point on this straight line are .....
(8)	If the two outer sides of two adjacent angles are perpendicular , then these two adjacent angles are .....
(9)	If the two outer sides of two adjacent angles are on the same straight line, then these two adjacent angles are .....
(10)	If the two adjacent angles are supplementary , then their outer sides are .....
(11)	If the sum of measures of two adjacent angles does not equal 180° , then their outer sides are .....
(12)	The measure of the angle which is equivalent to two right angles = ... and it is called ..... angle.
(13)	The angle whose measure is 50° complements an angle of measures ..... and supplements the angle whose measure is .....
(14)	The angle whose measure ..... complements the angle whose measure is 30° and supplements the angle whose measure is .....
(15)	The angle whose measure ..... complements the angle whose measure is ..... and supplements the angle whose measure is 150°
(16)	The acute angle complements ..... angle and supplements ..... angle.
(17)	Zero angle is complemented by ..... angle and is supplemented by ..... angle.
(18)	The right angle is complemented by ..... angle and is supplemented by ..... angle.

[7] Choose the correct answer:

(1) The obtuse angle supplements ..... angle.

(a) obtuse (b) right (c) acute (d) straight

(2) Between any two distinct points we can draw ..... straight line passing through them.

(a) zero (b) 1 (c) 2 (d) 3

(3) If : m (∠ A) + m (∠ B) = 180° , then ∠ A and ∠ B are .....

(a) equal in measure. (b) complementary.

(c) supplementary. (d) adjacent.

(4) If : $\overrightarrow{BA} \perp \overrightarrow{BC}$, then m (∠ ABC) = ...

(a) 40° (b) 90° (c) 180° (d) 360°

(5) If : ∠ A supplements ∠ B , ∠ A supplements ∠ C, then ∠ B and ∠ C are .....

(a) equal in measure. (b) complementary.

(c) supplementary. (d) adjacent.

(6) If : m (∠ X) = 15° , then the two angles whose measures are 2 m (∠ X) , 4 m (∠ X) are .....

(a) complementary. (b) supplementary.

(c) equal in measure. (d) obtuse angles.

(7) If : m (∠ A) = 2 m (∠ B) , ∠ A supplements ∠ B, then m (∠ B) = ...

(a) 30° (b) 60° (c) 120° (d) 90°

(8) $\overline{AB}$ ..... $\overrightarrow{AB}$

(a) $\in$ (b) $\notin$ (c) $\subset$ (d) $\not\subset$

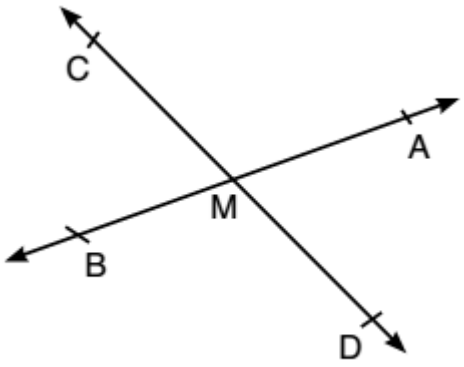
(9) If : m (∠ X) = 2 m (∠ Y) and ∠ Y is an obtuse angle, then ∠ X is .....

(a) acute. (b) right. (c) obtuse. (d) reflex.

Sheet (3)

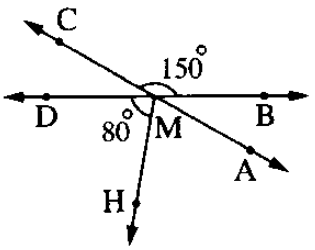
Some Relations Between Angles (follow)

vertically opposite angles

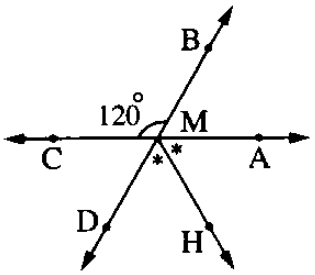


If two straight lines intersect, then the measures of each two vertically opposite angles are equal.

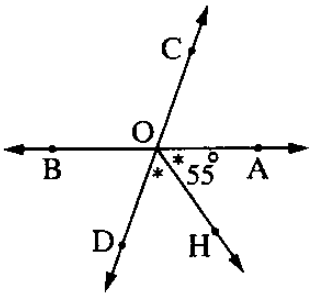
[1] In each figure, find the measure of the required angle:



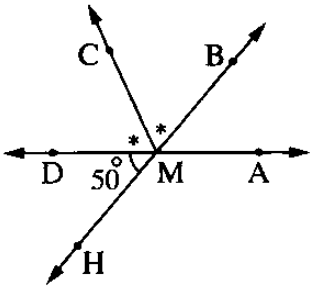
(1) m (∠ AMH) = ...°



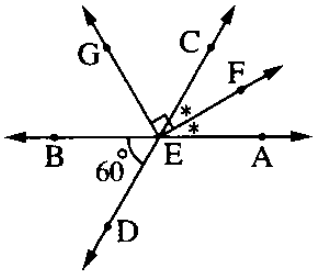
(2) m (∠ HMD) = ...°



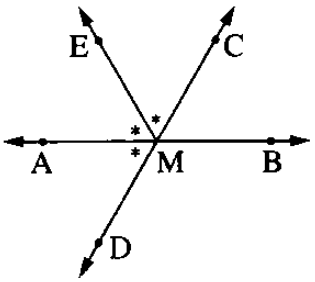
(3) m (∠ COB) = ...°



(4) m (∠ AMC) = ...°



(5) m (∠ GEB) = ...°

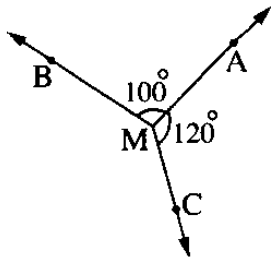


(6) m (∠ DMB) = ...°

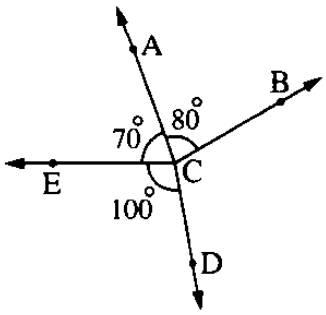
Accumulative angles at a point

The sum of the measures of the accumulative angles at a point is 360°

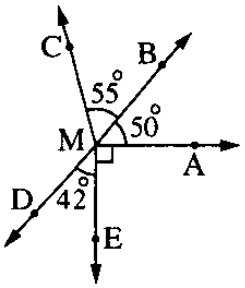
[2] In each figure, find the measure of the required angle:



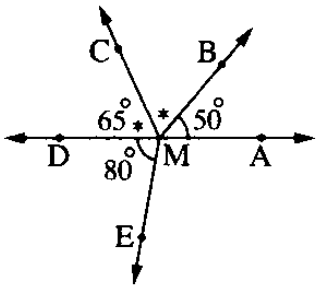
(7) m (∠ BMC) = ...°



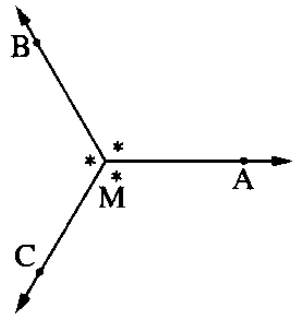
(8) m (∠ BCD) = ...°



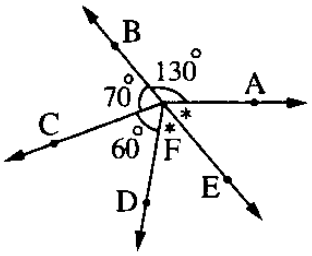
(9) m (∠ CMD) =.....°



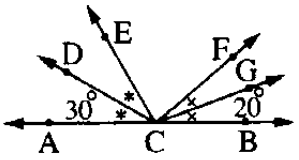
(10) m (∠ AME) = ...°



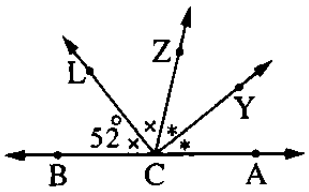
(11) m (∠ AMC) = ...°



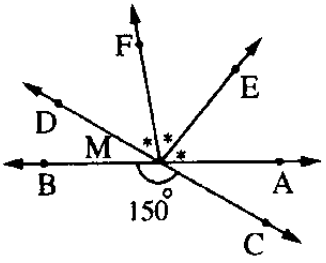
(12) m (∠ EFD) = ...°



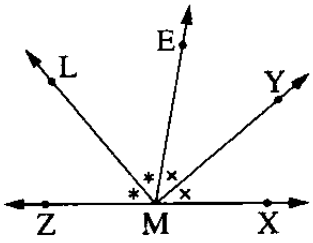
(13) m (∠ FCE) = ...°



(14) m (∠ YCA) = ...°

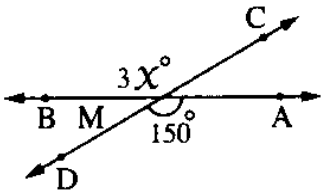
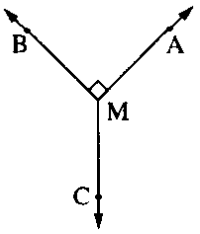
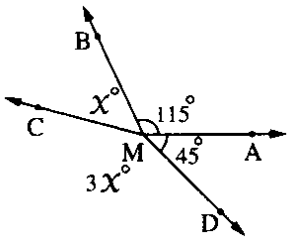


(15) m (∠ CMF) = ...°



(16) m (∠ YML) = ...°

[3] Complete:

(1)	If two straight lines intersect , then each of two vertically opposite angles are .....
(2)	The sum of the measures of the accumulative angles at the point equals .....°
(3)	**In the opposite figure :** $\overleftrightarrow{AB} \cap \overleftrightarrow{CD} = \{M\}$, then x = ...° 
(4)	**In the opposite figure :** $\overrightarrow{MB} \perp \overrightarrow{MA}$ and $\overrightarrow{MC}$ bisects the reflexed angle AMB , then m (∠ AMC) = ...° 
(5)	**In the opposite figure :** x = ...° 

The angle bisector:

It is the ray that divides the angle into two halves.

If $\overrightarrow{BD}$ bisects ∠ ABC

and m (∠ ABD) = 35° , then m (∠ ABC) = ...°

[4] Choose the correct answer:

(1)	The sum of the measures of the accumulative angles at the point equals ..... angles. (a) 2 right (b) 3 right (c) 4 right (d) 5 right
(2)	The sum of measures of 4 accumulative angles at the point ..... the sum of measures of 5 accumulative angles at the point. (a) = (b) < (c) > (d) ≠

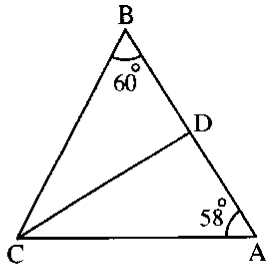
(3) The two bisectors of two adjacent supplementary angles .....

(a) are perpendicular. (b) are parallel.

(c) are coincident (d) included an acute angle between them.

(4) **In the opposite figure :**

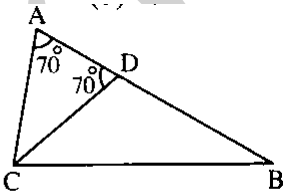
If ABC is a triangle in which $\overrightarrow{CD}$ bisects ∠ ACB , m (∠ A) = 58° , m (∠ B) = 60° , then m (∠ ADC) = ...



(a) 62° (b) 89° (c) 91° (d) 130°

(5) **In the opposite figure :**

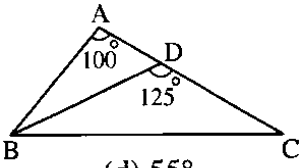
If $\overrightarrow{CD}$ bisects ∠ BCA , m (∠ A) = m (∠ ADC) = 70° , then m (∠ B) = ...



(a) 70° (b) 30° (c) 80° (d) 40°

(6) **In the opposite figure :**

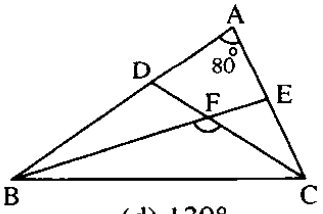
ABC is triangle , D ∈ $\overline{AC}$ and $\overrightarrow{BD}$ is a bisector of ∠ B , what is the measure of ∠ C ?



(a) 25° (b) 30° (c) 45° (d) 55°

(7) **In the opposite figure :**

m (∠ A) = 80° , $\overrightarrow{BE}$ is the bisector of ∠ B , $\overrightarrow{CD}$ is the bisector of ∠ C what is the measure of the shown angle BFC ?



(a) 80° (b) 100° (c) 120° (d) 130°

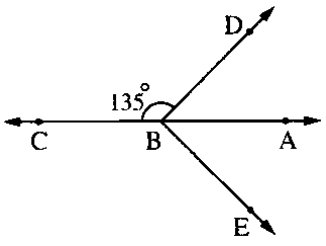
[4] Answer the following:

(1) **In the opposite figure:**

If B ∈ $\overleftrightarrow{AC}$, m (∠ DBC) = 135° and $\overrightarrow{BA}$ bisects ∠ DBE

Find each of :

m (∠ ABD) , m (∠ DBE) , m (∠ CBE)

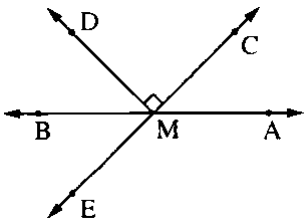


(2) **In the opposite figure:**

If $\overleftrightarrow{AB} \cap \overleftrightarrow{CE} = \{M\}$, $\overleftrightarrow{MD} \perp \overleftrightarrow{CE}$, and $\overrightarrow{MB}$ bisects ∠ DME

Find the measures of the following angles :

∠ BME , ∠ DME , ∠ AMC and ∠ AME

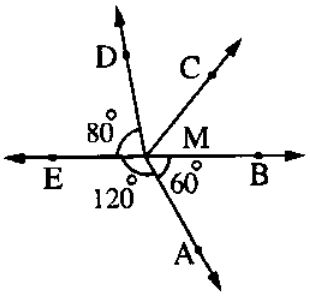


(3) **In the opposite figure:**

$m(\angle AMB) = 60°$, $m(\angle AME) = 120°$,

$m(\angle EMD) = 80°$

and $\overrightarrow{MC}$ bisects $\angle BMD$



Find :

(1) $m(\angle CMD)$ (2) $m(\angle AMC)$

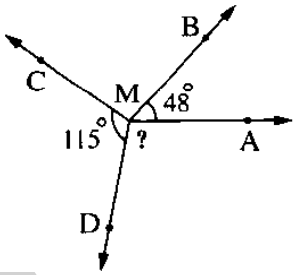
(4) **In the opposite figure:**

$m(\angle BMC) = 2\, m(\angle AMB)$,

$m(\angle AMB) = 48°$

and $m(\angle DMC) = 115°$

Find : $m(\angle AMD)$



Sheet (4)
Congruence

(1) **Two line segments are congruent if they are equal in length. if $AB = XY$ then $\overline{AB} \equiv \overline{XY}$.**

(2) **Two angles are congruent if they are equal in measure. if $m(\angle A) = m(\angle B)$ then $\angle A \equiv \angle B$.**

(3) **Two polygons are congruent if each side and each angle in one of them are congruent to their corresponding elements in the other.**

(4) **Two squares are congruent of the side length of one of them is congruent to the side length of the other.**

(5) **Two rectangles are congruent if the dimensions of one of them are congruent to the dimensions of the other.**

[1] Complete the following:

(1)	The two line segments are congruent if .....
(2)	The two angles are congruent if .....
(3)	The two polygons are congruent if there is a correspondence between their vertices such that each ..... and each ..... in the first polygon is congruent to its corresponding element in .....
(4)	The axis of symmetry of a polygon divides it into two ..... polygons.
(5)	If $\overline{AB} \equiv \overline{CD}$, then AB = ...
(6)	If $\overline{AB} \equiv \overline{XY}$, then AB – XY = ...
(7)	If $\angle A \equiv \angle B$ and m ($\angle A$) = 50° , then m ($\angle B$) = ...°
(8)	If $\angle A$ supplements $\angle B$ and $\angle A \equiv \angle B$, then m ($\angle B$) = ...°
(9)	If $\angle A$ complements $\angle B$ and $\angle A \equiv \angle B$, then m ($\angle A$) = ...°
(10)	If C is the midpoint of $\overline{AB}$, then $\overline{AC}$ ..... $\overline{BC}$

(11)	If the polygon ABCD ≡ the polygon XYZL , then $\overline{DA}$ ≡ ..... , m (∠ BCD) = m (∠ .....)
(12)	The two squares are congruent if ..... are equal in length , while the two rectangles are congruent if ..... are equal.

[2] Answer the following:

(1) **In the opposite figure:**

The two pentagons shown are congruent

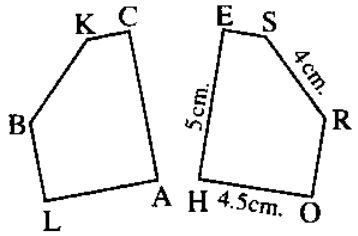
Complete :

(1) B corresponds to .....

(2) The polygon BLACK is congruent to the polygon .....

(3) KB = ... cm. (4) m (∠ E) = m (∠ .....)

(5) CA = ... cm. (6) m (∠ A) = m (∠ .....)



(2) **In the opposite figure:**

If C ∈ $\overleftrightarrow{BD}$, m (∠ AFC) = 110° , BC = 5 cm.

and the polygon ABCF ≡ the polygon EDCF

Complete the following :

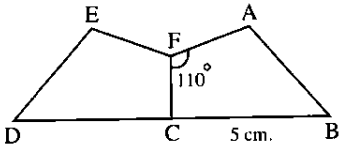
(1) AB = ... (2) AF = ... (3) CD = ...

(4) $\overline{CF}$ is ..... side. (5) m (∠ E) = m (∠ .....) (6) m (∠ B) = m (∠ .....)

(7) m (∠ FCD) = m (∠ .....) (8) m (∠ EFC) = ... ° (9) BD = ... cm.

(10) m (∠ FCD) = ... ° (11) m (∠ AFE) = ... °

(12) The axis of symmetry of the polygon ABDEF is .....



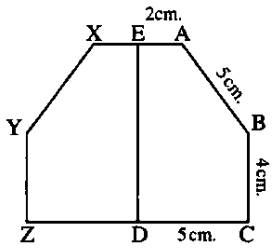
(3) **In the opposite figure:**

If : D ∈ $\overleftrightarrow{CZ}$ and the figure ABCDE ≡ the figure XYZDE ,

AE = 2 cm. , BC = 4 cm. and AB = CD = 5 cm.

Find :

The perimeter of the figure ABCZYX = ... cm.



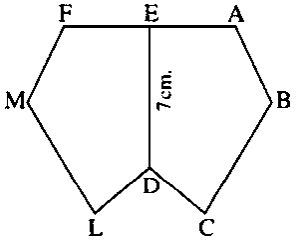
(4) **In the opposite figure:**

If : E ∈ $\overleftrightarrow{AF}$, the perimeter of the figure ABCDE = 27 cm. ,

DE = 7 cm.

and the polygon ABCDE ≡ the polygon FMLDE

Find : The perimeter of the figure ABCDLMF = ... cm.

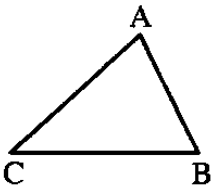


Sheet (5)
Congruent triangles

We know that any triangle has three sides and three angles which are known as the six elements of the triangle.

For example :

Δ ABC has three sides which are : $\overline{AB}$, $\overline{BC}$ and $\overline{AC}$ and it has three angles which are : $\angle A$, $\angle B$ and $\angle C$



Therefore :

The two triangles are congruent if each element of the 6 elements of one of them is congruent to the corresponding element in the other triangle and vice versa.

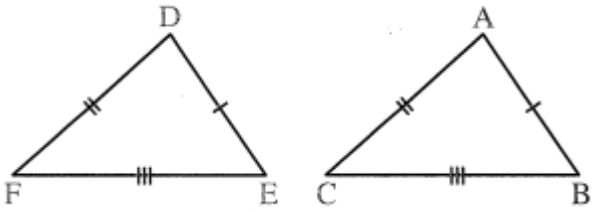
- To test whether two triangles are congruent or not, you don't need to test all the three sides and the three angles.

The cases of congruence of two triangles

Case (1)	Case (2)	Case (3)	Case (4)
Two sides and the included angle	Two angles and one side	Three sides	Hypotenuse and one side in the right-angled triangle
S. A. S.	A. S. A.	S. S. S.	R. H. S.
Two triangles are congruent if two sides and the included angle of one triangle are congruent to the corresponding parts of the other triangle	Two triangles are congruent if two angles and the side drawn between their vertices of one triangle are congruent to the corresponding parts of the other triangle	Two triangles are congruent if each side of one triangle is congruent to the corresponding side of the other triangle	Two right-angled triangles are congruent if the hypotenuse and a side of one triangle are congruent to the corresponding parts of the other triangle

Remark

If each angle of one triangle is congruent to the corresponding angle of the other triangle , it is not necessary for the two triangles to be congruent.



Prove that Δ A B C ≡ Δ D E F

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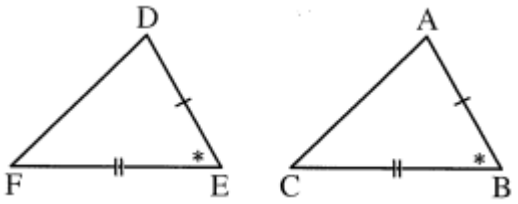

Prove that Δ A B C ≡ Δ D E F

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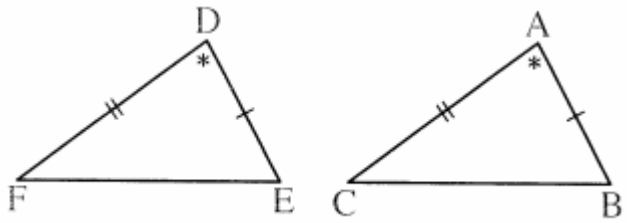

Prove that Δ A B C ≡ Δ D E F

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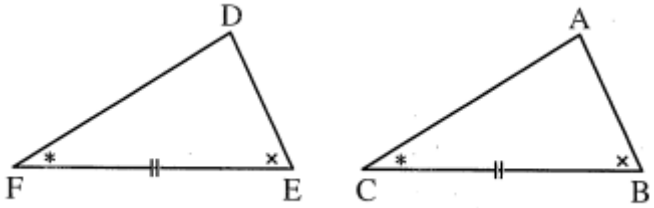

Prove that Δ A B C ≡ Δ D E F

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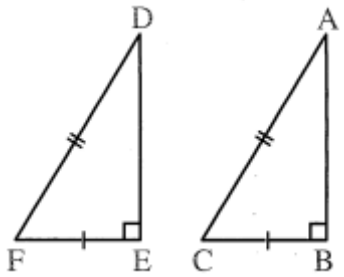

Prove that Δ A B C ≡ Δ D E F

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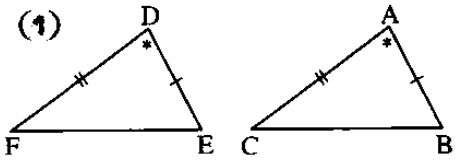
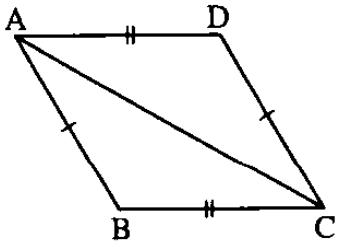
[1] In each of the following figures, show if the two triangles are congruent or not. If they are congruent, name the case of congruence. If they aren't congruent, give reason. (given that the similar signs denoted the congruency of the elements marked by these signs).

(1)



(2)



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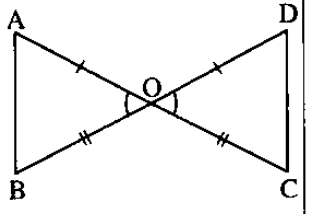

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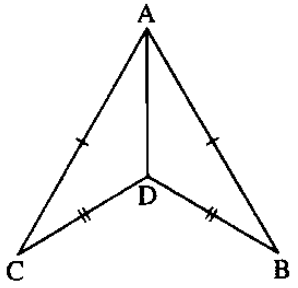

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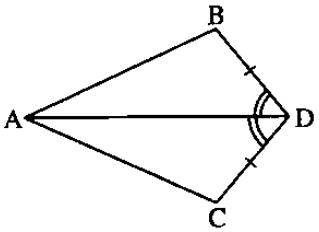
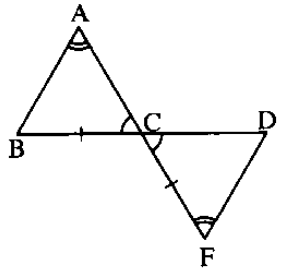


(6)



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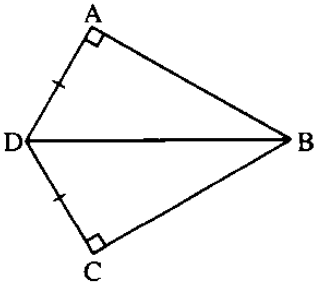

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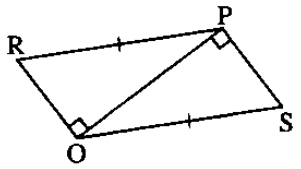

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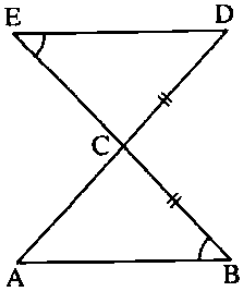

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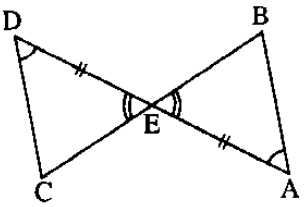
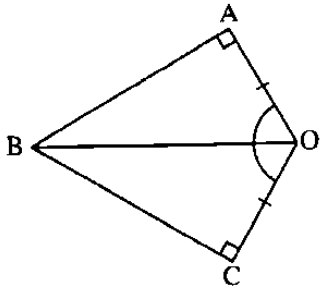


(11)



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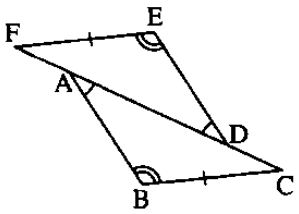

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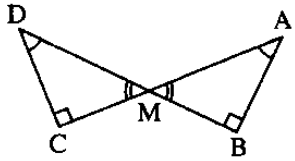
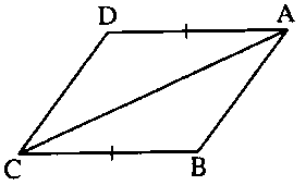
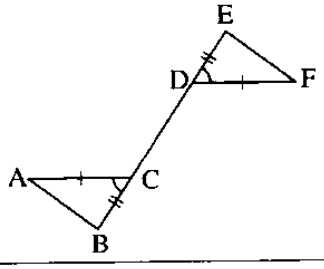


(14)



(15)



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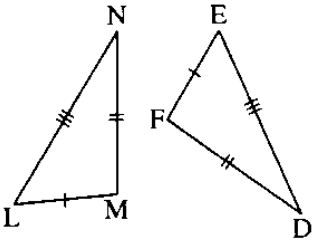

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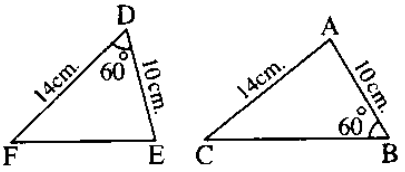

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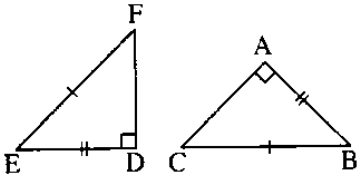

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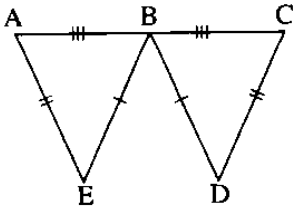

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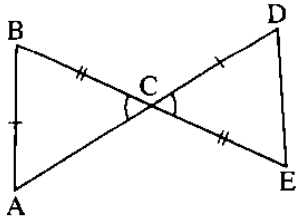

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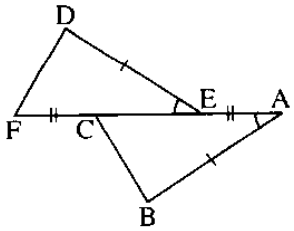

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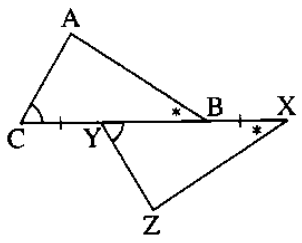

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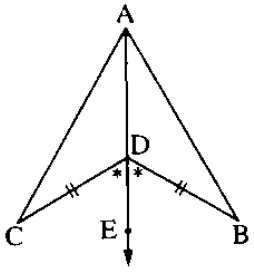

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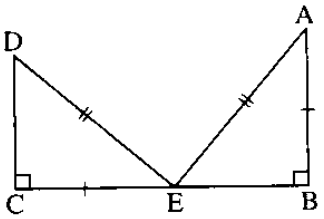

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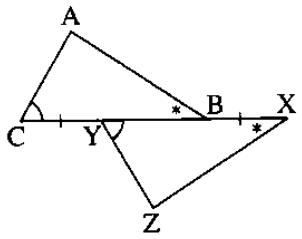
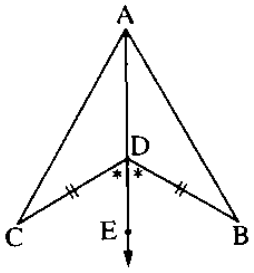
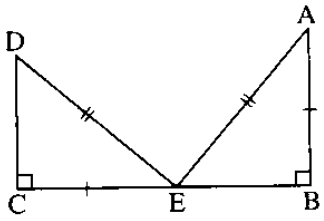


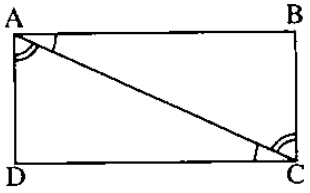
(23)



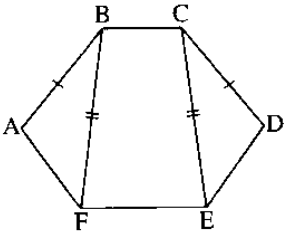
(24)



(25)



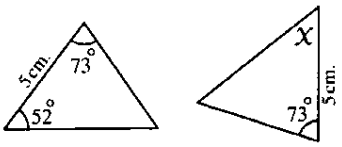
(26)



[2] Answer the following:

(1) **In the opposite figure:**

These triangles are congruent , then x = ...°



(2) **In the opposite figure:**

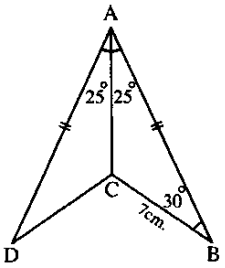
If : AB = AD , BC = 7 cm. , m (∠ BAC) = m (∠ DAC) = 25°

and m (∠ B) = 30°

Complete the following :

(1) Δ ACB ≡ Δ ..... (2) m (∠ D) = ...°

(3) CD = ... cm. (4) m (∠ ACD) = ...°

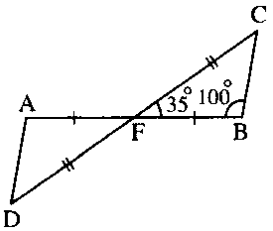


(3) **In the opposite figure:**

If : $\overline{CD} \cap \overline{BA} = \{F\}$, FA = FB , CF = FD ,

m (∠ CFB) = 35° and m (∠ B) = 100° ,

then m (∠ D) = ...°



(4) **In the opposite figure:**

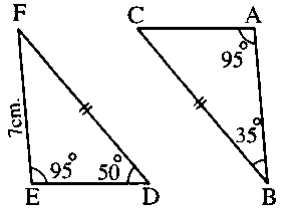
If : BC = FD , m (∠ A) = m (∠ E) = 95° ,

m (∠ B) = 35° , m (∠ D) = 50° and FE = 7 cm.

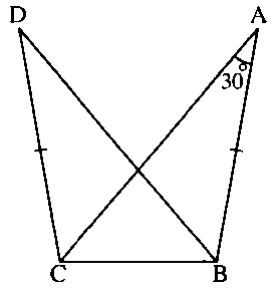
Complete the following :

(1) m (∠ C) = ...° (2) m (∠ F) = ...° (3) Δ ABC ≡ .....

(4) $\overline{AC}$ ≡ ..... (5) AB = ... cm.



(5) **In the opposite figure:**



If : AB = DC , AC = DB and m (∠ A) = 30°

Complete the following :

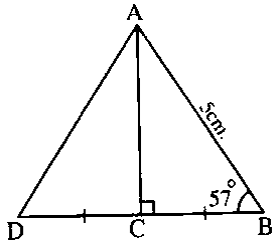
(1) Δ ABC ≡ Δ .....

(2) m (∠ D) = ...°

(3) m (∠ DBC) = m (∠ .....)

---

(6) **In the opposite figure:**



C is the midpoint of $\overline{BD}$, $\overline{AC} \perp \overline{BD}$,

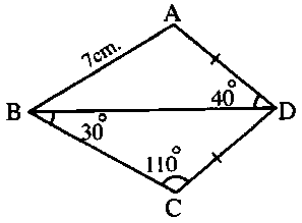
AB = 5 cm. and m (∠ B) = 57°

Find : (1) The length of $\overline{AD}$

(2) m (∠ DAC)

---

(7) **In the opposite figure:**



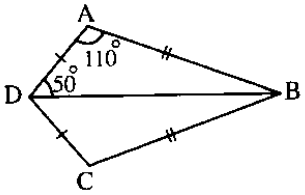
AD = DC , m (∠ ADB) = 40° , m (∠ DBC) = 30° ,

m (∠ BCD) = 110° and AB = 7 cm.

Find : (1) The length of $\overline{BC}$ (2) m (∠ BAD)

---

(8) **In the opposite figure:**



BA = BC , DA = DC ,

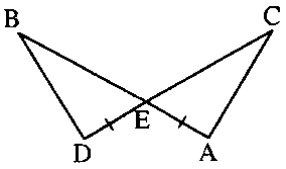
m (∠ ADB) = 50° and

m (∠ BAD) = 110°

Find : m (∠ ABC)

---

(9) **In the opposite figure:**



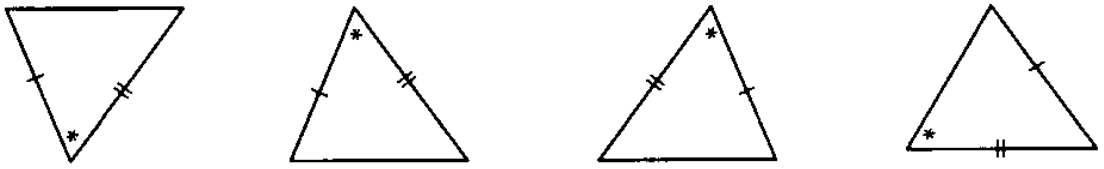
$\overline{AB} \cap \overline{CD} = \{E\}$, AE = ED and ∠ A ≡ ∠ D

Is Δ ACE ≡ Δ DBE ? Why ?

Prove that : CE = EB

[3] Choose the correct answer:

(1) The following triangles are congruent except .....

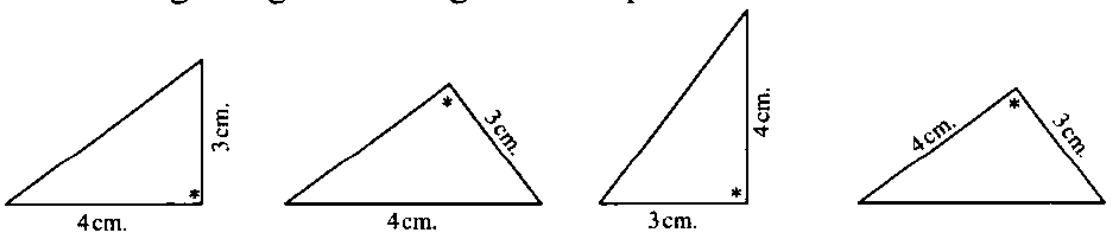


(a) (b) (c) (d)

(2) The following triangles are congruent except .....

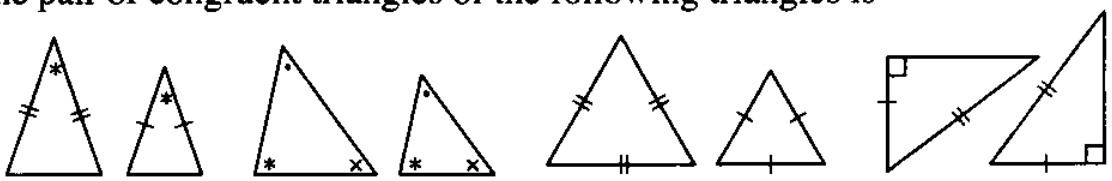
(a) (b) (c) (d)

(3) The following triangles are congruent except .....



(a) (b) (c) (d)

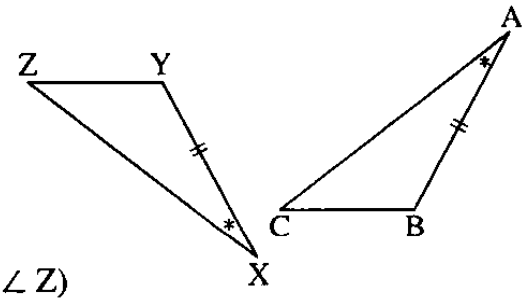
(4) The pair of congruent triangles of the following triangles is .....



(a) (b) (c) (d)

(5) **In the opposite figure :**

The necessary and enough condition which makes the two triangles ABC and XYZ be congruent is .....



(a) BC = YZ (b) AC = XZ

(c) m (∠ C) = m (∠ Z) (d) m (∠ B) = m (∠ Z)

[4] Complete the following:

(1) If : Δ ABC ≡ Δ XYZ , m (∠ A) = 50° and m (∠ B) = 60° , then : m (∠ Z) = ...°

(2) If : Δ ABC ≡ Δ LMN , m (∠ L) = 40° and m (∠ B) = 90° , then : m (∠ C) = ...°

(3) If : Δ ABC ≡ Δ XYZ and m (∠ A) + m (∠ B) = 120° , then : m (∠ Z) = ...°

(4) If : $\Delta ABC \equiv \Delta DEF$ and $m(\angle C) = 90°$, then : $m(\angle D) + m(\angle E) =$ .....°

(5) If : $\Delta ABC \equiv \Delta XYZ$, the perimeter of $\Delta ABC = 12$ cm. , $XY = 4$ cm. and $YZ = 5$ cm. , then : $AC =$ .....

(6) Any two triangles are congruent if each ..... is congruent to its corresponding side in the other triangle.

(7) Any two triangles are congruent if two angles and ..... in one of the triangles are congruent to their corresponding elements in the other.

(8) The diagonal of the rectangle divides its surface into two ..... triangles.

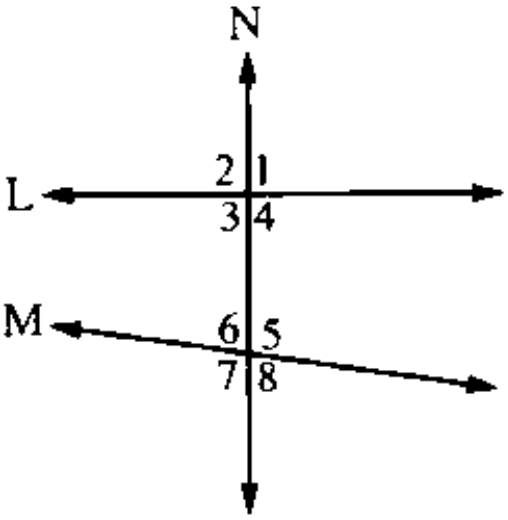
(9) If $\Delta ABC \equiv \Delta XYZ$, then $AB =$ ..... and $m(\angle Z) = m(\angle$ .....)

(10) If : $AB = LM$, $BC = MN$ and $m(\angle B) = m(\angle M)$, then the two triangles ..... and ..... will be congruent.

Sheet (6)
Parallelism

Angles Formed from two straight lines and a transversal:

If a straight line N cuts two straight lines L and M as shown in the opposite figure, then we get eight angles.

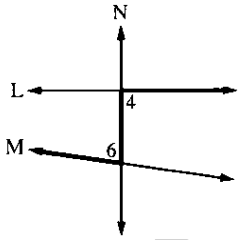


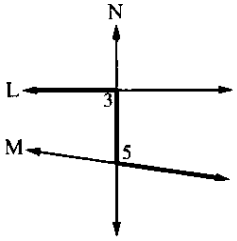
We can classify these angles into pairs of angles:

- Alternate angles.
- Corresponding angles.
- Interior angles on the same side of the transversal.

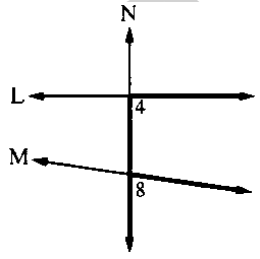
As follows

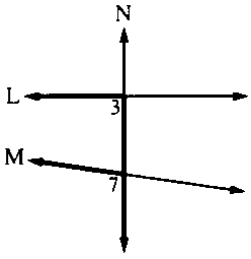
(1) Pairs of alternate angles:

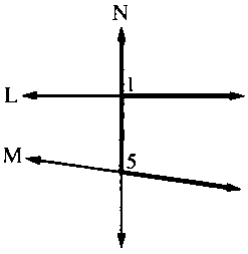


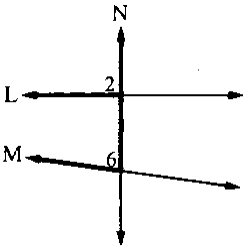


(2) Pairs of corresponding angles:

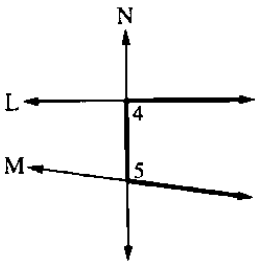


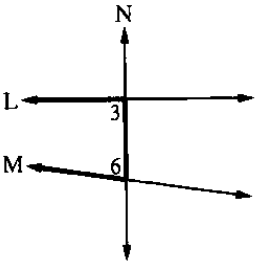






(3) Pairs of interior angles on the same side of the transversal





Relation between pairs of angles formed from two parallel straight lines and a transversal to them

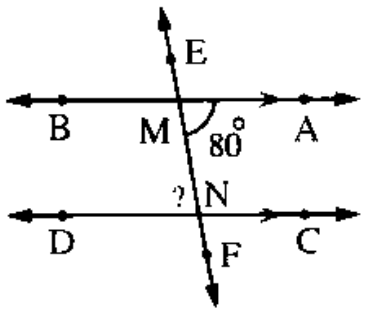
If a straight line intersects two parallel lines, then:

(1) Each two alternate angles are equal in measure.

(2) Each two corresponding angles are equal in measure.

(3) Each two interior angles in the same side of the transversal are supplementary.

In each of the following figures, find the measure of the angle which is marked by (?) giving reason:



(1)

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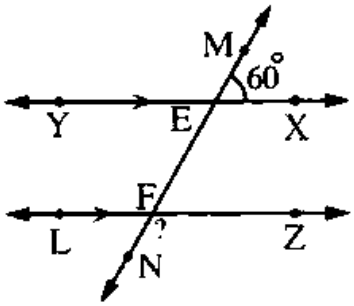

(2)

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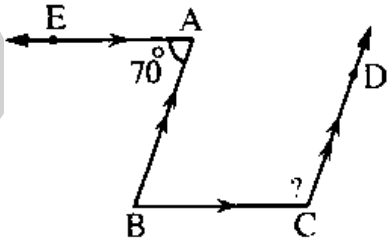

(3)

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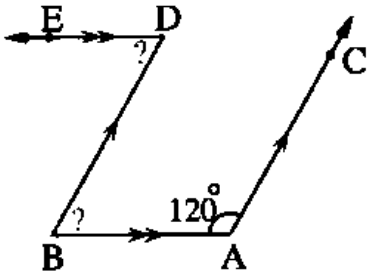

(4)

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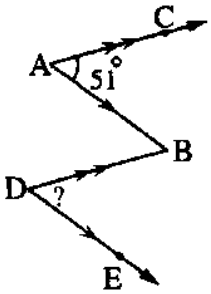

(5)

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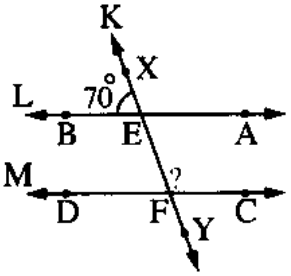

(6)

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The condition of parallelism of two straight lines

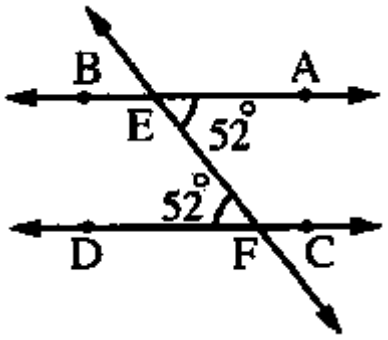
The two straight lines are parallel if a third straight line intersects them (as a transversal) and one of the following cases satisfied:

(1) Two alternate angles have the same measure.

(2) Two corresponding angles have the same measure.

(3) Two interior angles in the same side of the transversal are supplementary.

In each of the following figures, why is $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$?

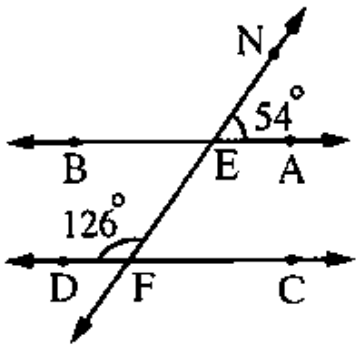


(1)

……

……

……

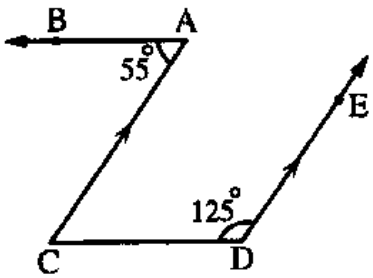


(2)

……

……

……



(3)

……

……

……

Geometric facts

(1) The perpendicular to one of two parallel straight lines is perpendicular to the other.

(2) If two straight lines are perpendicular to a third one, then the two straight lines are parallel.

(3) If two straight lines are parallel to a third one, then the two straight lines are parallel.

(4) If parallel straight lines divide a straight line into segments of equal lengths, then they divide any other line into segments of equal lengths.

If L_1 // L_2 // L_3 // L_4,

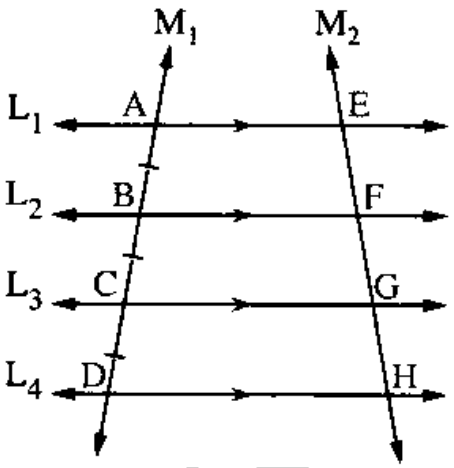
and M_1 and M_2 are two transversal

in which:

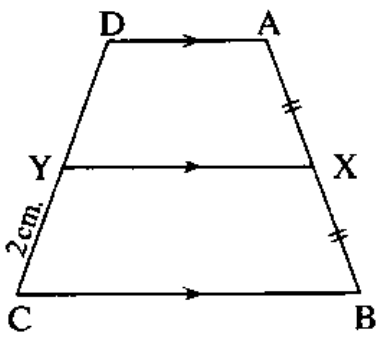
AB = BC = CD,

then:

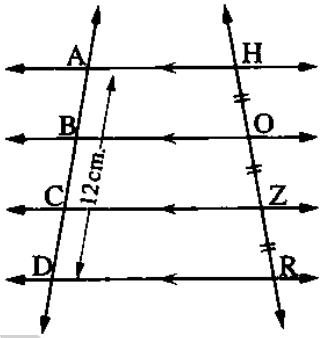
EF = FG = GH



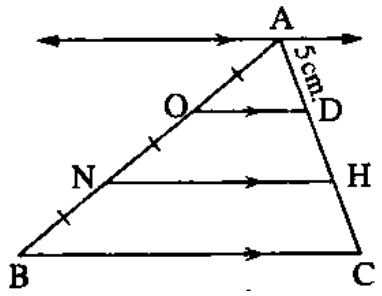
Complete using the given shown in the following figures:



DY = ... cm



AC = ... cm



AC = ... cm

[1] Choose the correct answer:

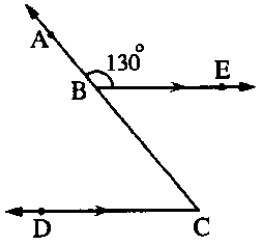
(1) **In the opposite figure:**

$B \in \overline{AC}$, $\overrightarrow{BE}$ // $\overrightarrow{CD}$ and m (∠ ABE) = 130°

Then m (∠ C) = ...

(a) 130° (b) 40°

(c) 50° (d) 90°



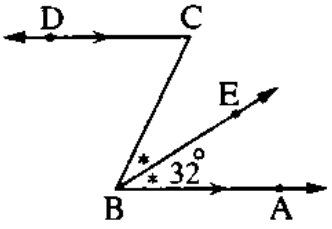
(2) **In the opposite figure:**

$\overrightarrow{BE}$ bisects ∠ ABC , $\overrightarrow{BA}$ // $\overrightarrow{CD}$ and

m (∠ ABE) = 32° , then m (∠ C) = ...

(a) 32° (b) 64°

(c) 60° (d) 80°



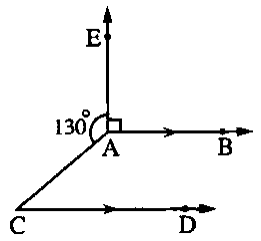
(3) **In the opposite figure:**

$\overrightarrow{AB} // \overrightarrow{CD}$, m (∠ EAC) = 130°

and m (∠ EAB) = 90° , then m (∠ C) = ...

(a) 90° (b) 130°

(c) 140° (d) 40°



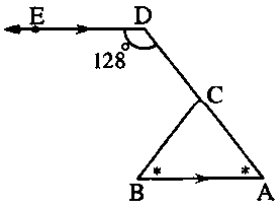
(4) **In the opposite figure:**

$\overline{AB} // \overrightarrow{DE}$, m (∠ D) = 128°,

m (∠ A) = m (∠ B) and C ∈ $\overrightarrow{AD}$, then m (∠ B) = ...

(a) 64° (b) 128°

(c) 52° (d) 26°



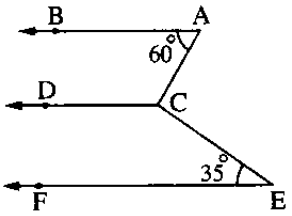
(5) **In the opposite figure:**

$\overrightarrow{AB} // \overrightarrow{CD}$, $\overrightarrow{AB} // \overrightarrow{EF}$, m (∠ A) = 60° and

m (∠ E) = 35° , then m (∠ ACE) = ...

(a) 60° (b) 35°

(c) 95° (d) 85°



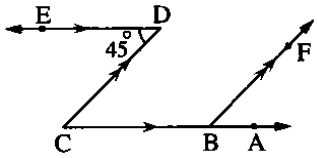
(6) **In the opposite figure:**

m (∠ D) = 45° , $\overrightarrow{DE} // \overrightarrow{CA}$ and

$\overline{CD} // \overrightarrow{BF}$, then m (∠ ABF) = ...

(a) 45° (b) 90°

(c) 135° (d) 40°



(7) **In the opposite figure:**

$\overline{AX} // \overline{BY} // \overline{CE} // \overline{DF}$,

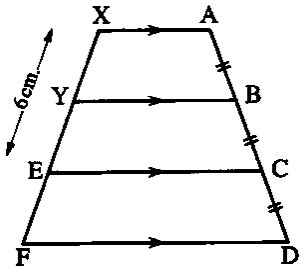
AB = BC = CD

and XE = 6 cm.

, then the length of $\overline{YF}$ = ...

(a) 3 cm. (b) 6 cm.

(c) 12 cm. (d) 9 cm.



(8) **In the opposite figure:**

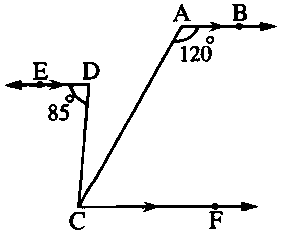
$\overrightarrow{AB} // \overrightarrow{CF} // \overrightarrow{DE}$,

m (∠ A) = 120° and m (∠ D) = 85° ,

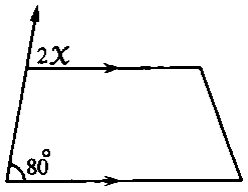
then m (∠ ACD) = ...

(a) 60° (b) 85°

(c) 25° (d) 120°



(9) **In the opposite figure:**



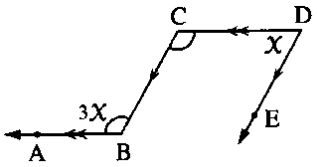
What is the value of X ?

(a) 40° (b) 60°

(c) 80° (d) 100°

---

(10) **In the opposite figure:**



$\overline{CD} // \overrightarrow{BA}$, $\overrightarrow{DE} // \overline{CB}$

, then : $X =$ .....

(a) 60° (b) 45°

(c) 120° (d) 90°

[2] Complete:

(1) The straight line which is perpendicular to one of two parallel straight lines is ..... to the other straight line in the plane.

---

(2) ___ If two straight lines are parallel to a third straight line , then they are .....

---

(3) If a straight line cuts two parallel straight lines , then each two alternate angles are .....

---

(4) If a straight line cuts two parallel straight lines , then each two corresponding angles are .....

---

(5) If a straight line cuts two parallel straight lines , then each two interior angles in the same side of the transversal are .....

---

(6) If a straight line cuts two straight lines and there are two corresponding angles having the same measure , then the two straight lines are .....

---

(7) If a straight line cuts two straight lines and there are two alternate angles having the same measure , then the two straight lines are .....

---

(8) If a straight line cuts two straight lines and there are two interior angles in the same side of the transversal are supplementary , then the two straight lines are .....

---

(9) If a straight line cuts several parallel lines and the intercepted parts of this transversal between these parallel straight lines are equal in length , then the intercepted parts for any transversal are .....

[3] Answer the following:

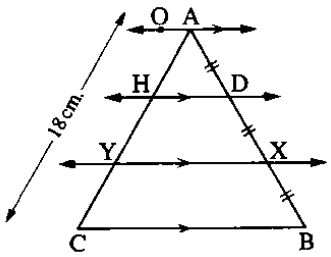
(1) In the opposite figure:

$\overleftrightarrow{AO} // \overleftrightarrow{HD} // \overleftrightarrow{YX} // \overline{CB}$

, AD = DX = XB

and AC = 18 cm.

Find the length of $\overline{AY}$



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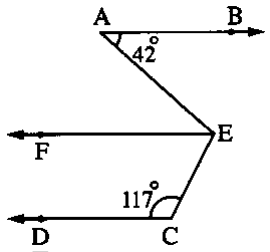
(2) In the opposite figure:

$\overrightarrow{AB} // \overrightarrow{CD}$, $\overrightarrow{EF} // \overrightarrow{CD}$

, m (∠ A) = 42° and m (∠ C) = 117°

Determine : m (∠ AEC)



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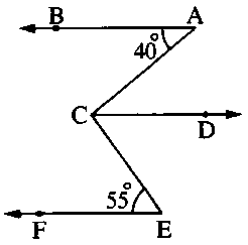
(3) In the opposite figure:

m (∠ A) = 40° , m (∠ E) = 55°

$\overrightarrow{AB} // \overrightarrow{EF}$ and $\overrightarrow{AB} // \overrightarrow{CD}$

Find : m (∠ ACE)



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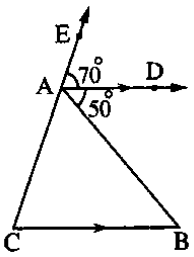
(4) In the opposite figure:

$\overrightarrow{AD} // \overline{BC}$, $E \in \overrightarrow{CA}$,

m (∠ DAE) = 70° and m (∠ DAB) = 50°

Find the measures of the triangle ABC



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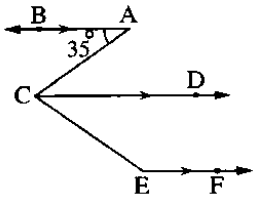
(5) In the opposite figure:

$\overrightarrow{AB} // \overrightarrow{CD} // \overrightarrow{EF}$, m (∠ A) = 35° and

$\overrightarrow{CD}$ bisects ∠ ACE

Find : (1) m (∠ DCE) (2) m (∠ CEF)



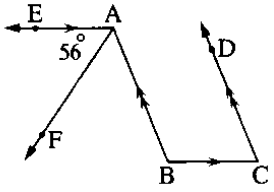
---

(6) In the opposite figure:

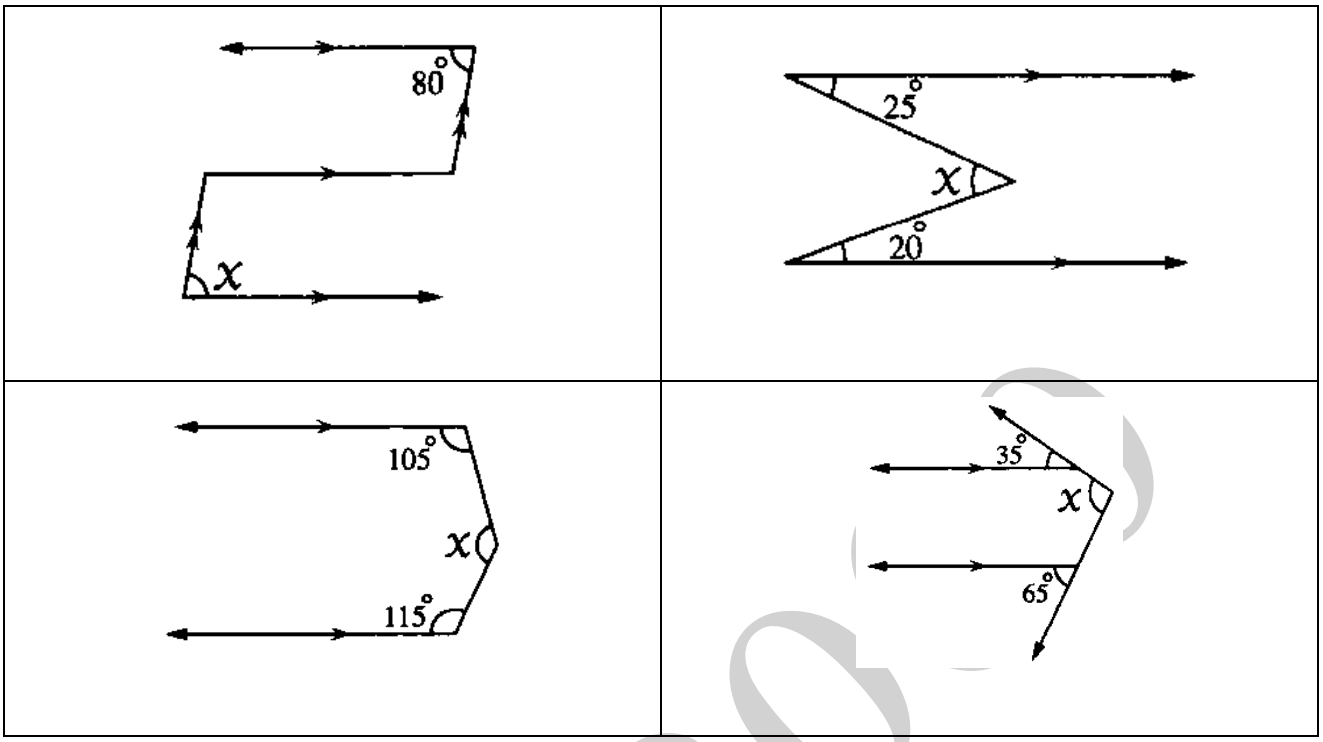
$\overrightarrow{AE} // \overline{CB}$, $\overline{BA} // \overrightarrow{CD}$,

$\overrightarrow{AF}$ bisects ∠ BAE and m (∠ EAF) = 56°

Find : m (∠ C)



[4] Find the value of x:



Sheet (7)

Geometric constructions

1)

Using the ruler and the compasses, draw ΔABC in which $AB = AC = 5$ cm., $BC = 6$ cm., then draw $\overline{AD} \perp \overline{BC}$ where $\overline{AD} \cap \overline{BC} = \{D\}$

Then find by measuring the length of $\overline{AD}$ (Don't remove the arcs)

2)

Using the ruler and the compasses, draw the line segment $\overline{BC}$ with length 7 cm., then draw the straight line L as an axis of symmetry of it. (Don't remove the arcs)

3)

Draw an angle whose vertex is A and its measure is 130° , use a ruler and a compasses to divide the angle A into 4 equal angles in measure. (Don't remove the arcs)

4)

Using the geometric instruments, draw an angle of measure 120° and bisect it (Don't remove the arcs).

5)

Using the geometric tools, draw an angle of measure 75° and bisect it (Don't remove the arcs).